

MEMORANDUM FOR: Assistant for Plans and Development

THROUGH : Acting Chief, Development Branch, P&DS

SUBJECT : Recommendation for Development of a Data Block Reader

1. PROBLEM:

At present, the only rapid readout capability of vehicle data is located in SPPL at Westover Air Force Base. The prescribed method for delivery of film to SPPL from the processing site is by aircraft. If weather conditions were such as to prevent delivery of the film in this manner, it would require shipment by train which would incur a 10 to 12 hour delay. When the film is received at SPPL the card deck will be produced from one readout. Actually, to present a check on instrument readout and data block image interpretability, it would be necessary to have three readouts for vehicle data confirmation. Information from the SI film could not be produced in card deck form since no instrumentation at present is capable of producing a readout of this data. This information therefore would necessitate a hand readout procedure.

2. DISCUSSION:

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In a conference with [REDACTED] personnel on 1 April 1963, it was learned that the "Flying Spot Scanner" would not be capable of a readout from the KH-6 system. The readout for the panoramic film would be produced from an instrument designed for use with the old E-5 program according to the latest information. No capability is available for instrument reading of the SI unit data block thus a hand readout will be necessary. The data information recorded in card decks will be the product of one readout. To provide a check on the readout, it is proposed that the "Data Block Reader" will produce vehicle data information from three readouts of a pass. NPIC is now dependent entirely upon SPPL for readout and verification of vehicle data information. An "in-house" readout capability would enable NPIC to realize a savings in time and effort which would be required by additional readout and verification of data block information by SPPL.

The present "in-house" binary readout capability is limited due to the speed (approximately 9 feet or 3 frames per minute) and accuracy of the "bread-board" type of instrument now in operation. The proposed "Data Block Reader" will be able to accurately scan at an approximate rate of 150 feet per minute although designed for a 200 foot per minute scan rate. The new "Data Block Reader" will be so designed that it will be capable of handling either negative or positive film, thus it can serve as a backup unit to the Westover instrument and would expedite receipt of vehicle data information through installation at

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The processing site and recording these data from the duplicate positive film. (Included as an addendum to this report is an approximate time sequence for an average Keyhole mission from the time the film is received at the processing plant to the estimated time of receipt of the card deck readout at NPIC.)

An installation of the "Data Block Reader" at the processing site would not only produce a savings in time by transmission of vehicle data prior to receipt of duplicate film at Westover, but would possibly also allow review and correction of vehicle data readout. In the 21 hour time lapse between transmission from Westover and the proposed readout, the Univac 490 computer could be programmed and ephemeral data produced and distributed. Vehicle data information could be transmitted from the processing site in a number of ways. A card deck, punched tape or magnetic tape could be produced as the duplicate positive film of each pass became available and sent, en toto, by the time production of duplicate positive film was completed. This would allow a continuous transmission of information over a Dataphone or similar system. The second method would be to send the vehicle data information by Dataphone as it became available from each pass. The first method would involve no time delays in transmission and appears to be the better procedure. It would be the primary consideration in design of the "Data Block Reader" that no possible film damage would result from the use of the duplicate positive film.

### 3. CONCLUSIONS:

In conclusion, a fast and accurate, "in-house" capability for vehicle data readout would serve as a backup system for the program. An installation of the "Data Block Reader" at the processing site would produce a savings in time through transmission of information from the duplicate positive film to NPIC and other areas requiring an immediate readout and would avoid dependence of NPIC operations upon another facility. Receipt of a readout would not be dependent upon weather and in addition, confirmation of transmitted data information would be included in the proposed three readouts per pass by the Data Block Recorder. Confirmation would necessarily have to be requested from Westover since their readout is a product of one scan per pass and not three as is our proposal. Under these conditions it is imperative that a Data Block Reader be available at the processing site and/or NPIC.

### 4. RECOMMENDATION:

It is recommended that the necessary procedures be inaugurated to obtain an instrument sufficiently versatile to read recorded vehicle data of present systems and to take into account possible future systems which will also use some type of dot-recorded information on film. At present, it seems that the [REDACTED] has the experience and ability to produce such an instrument, however, other firms will be contacted and evaluation of their capabilities reported.

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An approximate history of the film handling procedure is given to illustrate the times involved for a mission received at the processing site.

A. FIRST DAY

<u>Procedure</u>	<u>Elapsed Time Sequence In Hours</u>
1. Receipt of film at processing site	--
2. Presplicing and processing completed on first portion (approx 500 feet)	3
3. Breakdown of original negative film into individual passes started	3½
4. Titling of first pass of original negative film started	4
5. Titling, lacquering and waxing of first pass of original negative film completed	5
NOTE: At this point in the sequential assembly, it would be possible to begin transmission of "batch" information of the data recorded on the binary in the Corona-type film. Since the above procedure is a continuing process, "batch" information can be sent pending the availability of each pass after waxing is completed, or a card deck produced and sent en toto for the entire mission when the last pass is waxed.	
6. First pass duplicate positive film processed and ready for viewing	13½
7. Breakdown of original negative film into individual passes completed	16
8. Titling, lacquering and waxing of last pass of original negative film completed	19

NOTE: Since the original negative is now totally available for readout, transmission of data from the binary and data block can be completed. Time interval from receipt of the film at the processing site to completion of data transmission is 19 hours.

B. SECOND DAY

1. Work print duplicate positive completed	25
2. Work print ready for shipment	30
3. Work print received at Westover	34
4. Readout of data completed	38
5. Card deck received at NPIC	46

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## DESIGN OBJECTIVES FOR THE DATA BLOCK READER

### 1. Operational Concept

In order that a vehicle data information reader be versatile enough to obtain information from a variety of systems using dot images recorded on film in various block format shapes and sizes, it is necessary that this instrument contain the circuitry efficiently designed to allow use of reading heads custom-tailored, if necessary, for each data block. The actual readout capability should be such that the recording may be made directly into a digital computer or stored on such media as perforated tape, magnetic tape or card decks. The reader must be able to accommodate various widths of spooled film from 16mm to 9½ inches and up to 500 feet in length. The film transport is to be designed so that no possible damage to the film will result while passing through the system. It must be capable of reading both negative and positive films accurately and quickly.

### 2. General Description.

Since space is of primary consideration, the instrument will be designed for compactness using the latest concepts of circuitry, optics and mechanics to provide overall quality equal to or better than those parameters enumerated in the specifications. External projections such as electrical and mechanical controls shall be conveniently placed and easily manipulated by any operator. The exterior of the cabinets should be free of sharp corners and finished with a smooth semi-gloss finish. Glass doors shall be provided so that the entire length of film travel can be viewed at all times by an operator. This may necessitate interior illumination of the film path. The entire instrument shall be enclosed to prevent excess dust accumulation. The back and sides may be

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3. Detailed Requirements.

a. Circuitry - All circuitry, where possible, should be of the solid-state type built up of small sub-chassis grouping to allow easy access and replacement, if necessary. The power source will be a standard three wire 110 volt, 60 cycles with voltage fluctuation correction capability inherent in the circuitry of the instrument. Provision shall be made so that the light sensor (photomultiplier) may be reversed in polarity to read from either negative or positive film image recordings. Sensitivity of the light sensor shall be such that variation of bit densities from 0.20 to 0.90 will not affect recording of bit information. If necessary, extraneous light entering the glass panels may be shielded but only in the immediate area of the photomultiplier.

b. Core Buffer - According to the frequency of signal from the register, an appropriate number of core buffers will be provided in the instrument. Measurements or samples of the various types of data blocks and their greatest bit concentration per frame will be provided.

c. Readout Accuracy - This will be based on the greatest concentration of bit information and film speed and must be of the highest accuracy attainable. Provision must be made for discerning flared bit and differentiate this from the separating gross fog found in the film base.

d. Film Transport - The design of the mechanism will be such as to allow passage of the film through the instrument and be rewound without scratching or frilling of the film or damaging it in any way. Provision shall be made for applying the minimum tension compatible with accurate metering of the film through the film gate. Film transport will be accomplished by servo units and have the capability of transporting the film up to speeds of 200 feet per minute in spools up to 500 feet in length. All rollers will have to be static-free

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prior to, and during their operation. Roller and film transport will facilitate

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use of film widths from 16mm to 9 $\frac{1}{2}$  inches in width.

e. Alinement and Travel of the CRT and Photomultiplier Tube - The CRT and photomultiplier tube shall have the capacity to move in the same plane over a total 10 inches in the "Y" direction in order that either margin of the interframe area may be scanned by these units. During traverse movement each unit will travel in parallel planes and at the same time retain the same axial relationship throughout the 10 inch travel.

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Handle Via TALENT KEYHOLE Channel

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HANDLE VIA TALENT-KEYHOLE CONTROLS ONLY



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